05/11/2015

BI-ECCENTRIC Disc Retention Valve

- Oscillating disc retention valve with dual eccentricity and straight seat.
- Option of manufacturing "WAFER" type or with flange boring in accordance with customer requirements.
- Distance between faces in accordance with Standard EN 558 Table 2 Series 13.
- These valves are fitted with an arrow indicating the direction of flow.
- Various construction materials available.
- The **RT** retention valve allows the fluid to flow through in one direction; it opens by the fluid passing through and closes due to the weight of the returning fluid, the weight of the disc and the counterweight.
- There is a hydraulic cylinder with damper in the last 10% of the closing.
- Option of regulating closing time with a regulation valve.
- The disc cannot be stopped in intermediate positions.

General applications:

- This retention valve is suitable for working in line and as a safety valve in cases of emergency.

Sizes:

- From DN150 to DN2000.
- Larger sizes on request.

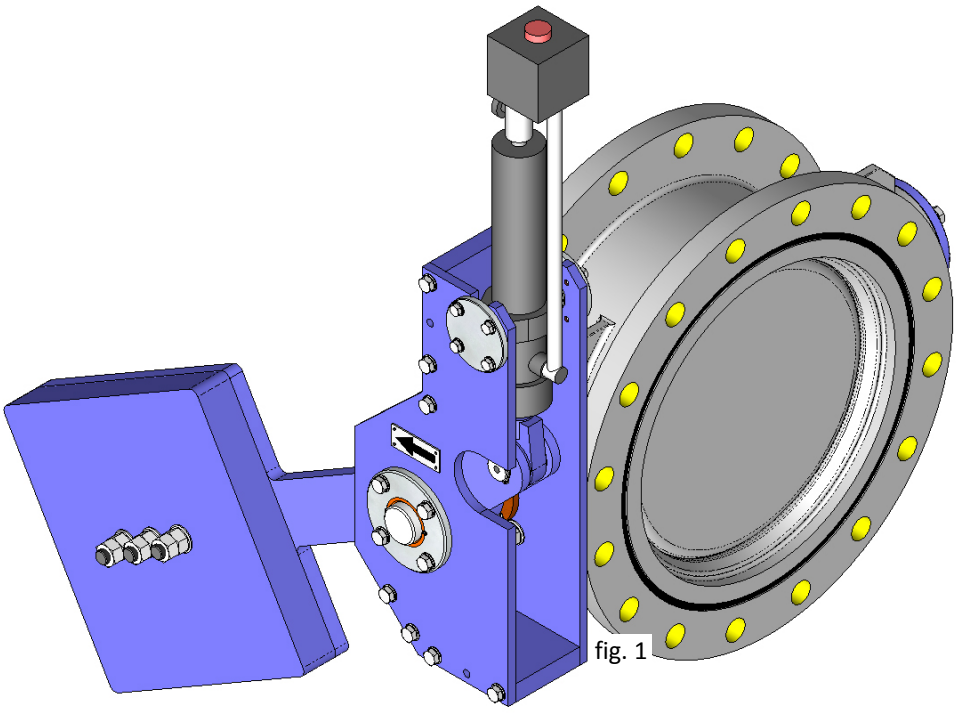


fig. 1

Working (ΔP):

- The differential pressure (ΔP) these valves can work at is highly variable, which is why design is in accordance with the requirements in each specific project. They can be designed to withstand high pressures.

Fluid speed:

- The maximum fluid speed these valves can work at is 4.9 m/s (in accordance with Standard AWWA C 504).

Joint flanges:

- There are two options to secure these valves to the duct:
  - Joint between flanges, the valve is manufactured with "WAFER" type design.

- Bolting the flanges, the valve is manufactured with drilled flanges in accordance with the standard requested by the customer.

In both variants, the valves are designed for flange attachment in accordance with specific standards. The most usual are as follows:

- PN10. - ANSI 150. - PN6. - PN16. -PN25.
- Australian Standard. - British Standard. - JIS Standard.

Directives:

- Machinery Directive: **DIR 2006/42/EC (MACHINERY).**
- Pressure Equipment Directive: **DIR 97/23/EC (PED) ART.3, P.3.**
- Explosive Atmospheres Directive: **DIR 94/9/CE (ATEX) CAT.3 ZONE 2 and 22 GD.** For information on categories and zones please contact **C.M.O.'s technical-sales department.**

Quality dossier:

- All valves are hydrostatically tested with water at **C.M.O.** and material and testing certificates can be supplied on request.
- Body test = Maximum working pressure x 1.5.
- Seal test = Maximum working pressure x 1.1.

Advantages of C.M.O.'s "RT Model"

The main characteristic of **C.M.O.'s RT** retention valve is its dual eccentricity design.

The rotation shaft is offset relative to the central plane of the clapper (Exc.1), and in turn is also offset relative to the central plane of the valve body (Exc.2, approximately 10% of the nominal diameter of the valve), thus obtaining dual eccentricity (fig. 2).

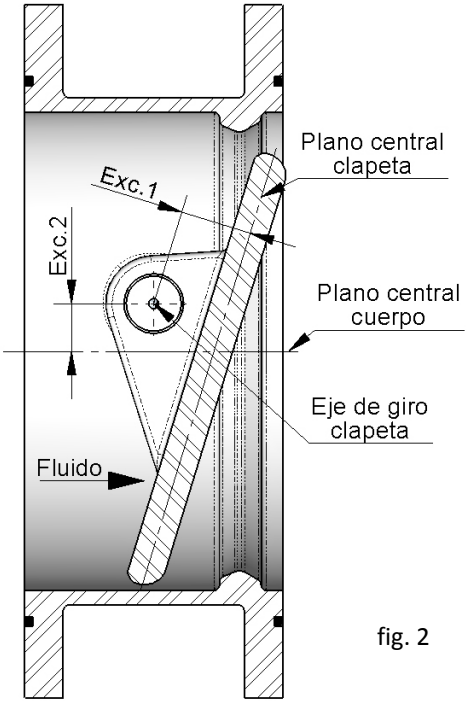


fig. 2

A highly effective sealing system is achieved thanks to this dual eccentricity. When the valve is designed with an elastomer seal, as soon as the valve starts to open, the seal is no longer compressed and does not rub against the body. For this reason the seal is not pressed until closing, thus avoiding any crushing and scraping of the seal, thus extending its working life.

Since the rotation shaft is offset relative to the central plane of the body (Exc.2), when the fluid coincides with the direction of the body's indication arrow, it tends to open the valve; in the direction opposite the body's indication arrow, it tends to close it. This is the basic function of the **RT**, since they are designed to work as safety valves in emergency situations.

They are also fitted with a hydraulic cylinder with damping in approximately the end 10% of the closing run. The other 90% can be adjusted by way of a regulation valve which restricts the passage of hydraulic oil between the cylinder and the tank, meaning the valve closing speed can be regulated.

RETENTION VALVE RT SERIES

The **RT** valve body consists basically of a collar of the same interior diameter as the duct where it is installed, with a flange on each end. There is the option of these flanges having a machined recess in order to house the O-ring; this option avoids the use of additional seals in order to mount the valve between flanges.
For sealing, the collar has a special machined stainless steel ring inside. The disc closes against this ring.
The seal is usually metal/metal; whenever the disc is not stainless steel, stainless steel is provided in the sealing area, in order to obtain a 100% stainless steel seal.
However, there is the option of sealing with seals. In this case the disc is fitted with an elastomer seal which closes against the body's stainless steel ring.
In both cases, the seal is efficient and there is minimum disturbance in the flow.

Thanks to the characteristics mentioned and its simplicity, it is a robust, economical valve which is highly suited to working as a safety valve in cases of emergency.

However, it is not suitable for regulating flow. When the valve is completely open, the disc is parallel to the direction of flow and the disturbance generated in the flow is minimum. However, when the degree of opening is lower, there is greater disturbance produced by the disc, since it is more perpendicular to the flow, resulting in greater vibrations and turbulence.

These valves are highly suited for use in emergency situations. When they open due to the passage of fluid through the valve, they are usually completely open, thus generating minimum disturbance in the flow. However, when an emergency situation comes about, they close quickly to avoid permanent medium degrees of opening.
The counterweight and hydraulic cylinder system are only used to ensure sealing and damping, and the closing time can be regulated.
Given these characteristics, the disc cannot be stopped in intermediate positions.

RETENTION VALVE

RT SERIES

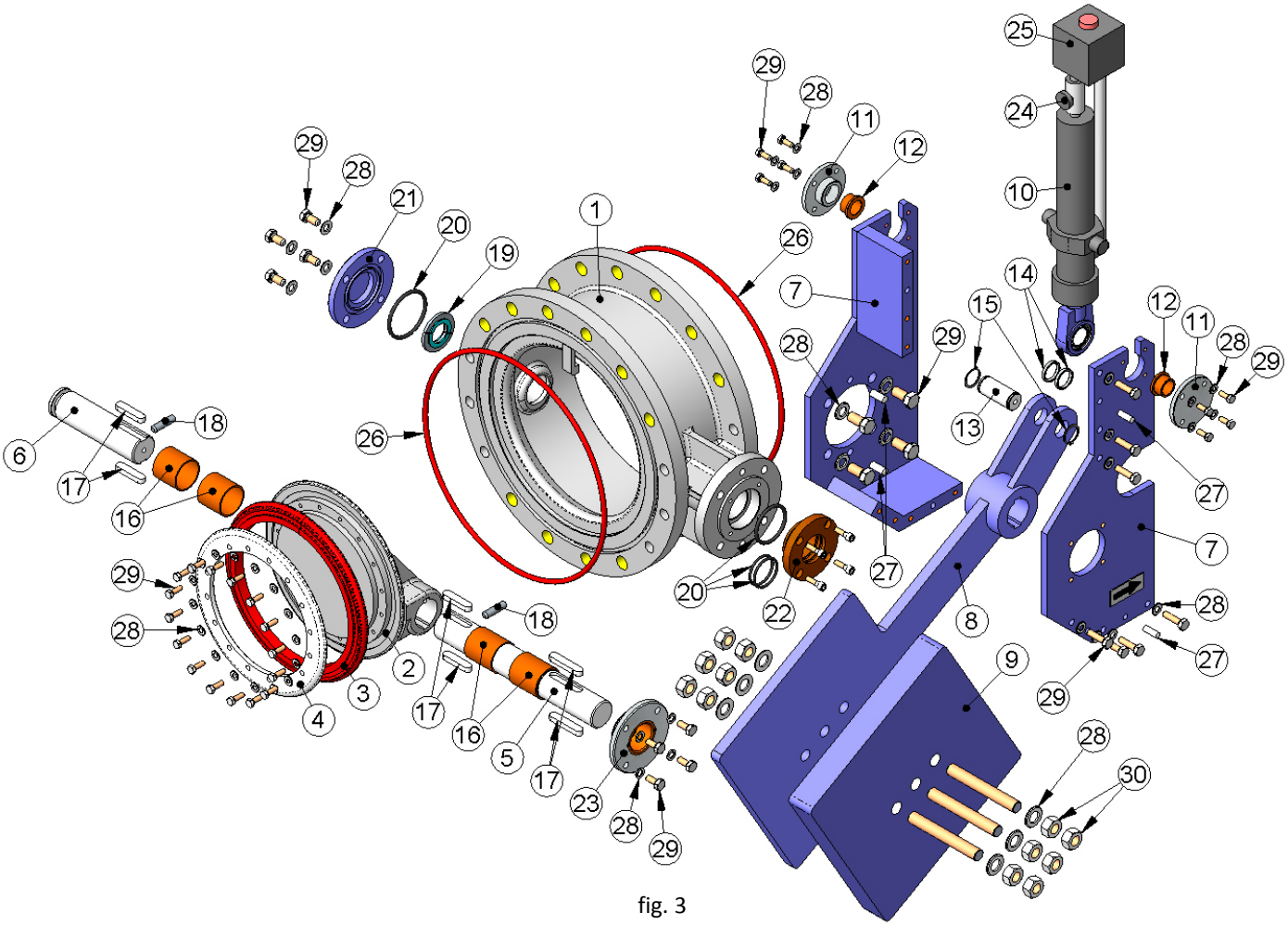


fig. 3

STANDARD COMPONENTS LIST			
POS.	**COMPONENT**	**POS.**	**COMPONENT**
1	BODY	16	BUSH BEARING
2	DISC	17	COTTER
3	SEAL	18	PIN
4	SEAL FLANGE	19	FRICTION WASHER
5	DRIVE SHAFT	20	O-RING CORD
6	DRIVEN SHAFT	21	SOLID COVER
7	ACTUATOR SUPPORT	22	GUIDE COVER
8	COUNTERWEIGHT ARM	23	MOUNT COVER
9	COUNTERWEIGHT PLATE	24	THROTTLE VALVE
10	HYDRAULIC CYLINDER	25	OIL TANK
11	MOUNT COVER	26	O-RING CORD
12	BUSH BEARING	27	PIN
13	PIN	28	WASHER
14	DISTANCER BUSHING	29	BOLT
15	CIR-CLIP	30	NUT

table 1

DESIGN CHARACTERISTICS

1- BODY

The body of the **RT** valve is a single piece of cast iron. Its geometry consists basically of a collar of the same interior diameter as the duct where it is installed, with a flange on each side. In these flanges, having a recess throughout the diameter to house the O-ring is optional.

A ring is fitted inside the collar for sealing. This ring is always finished in stainless steel, which is machined for efficient sealing and to produce minimum disturbance in the flow.

The interior design of the body provides small losses of load and prevents solids from being deposited in the sealing area.

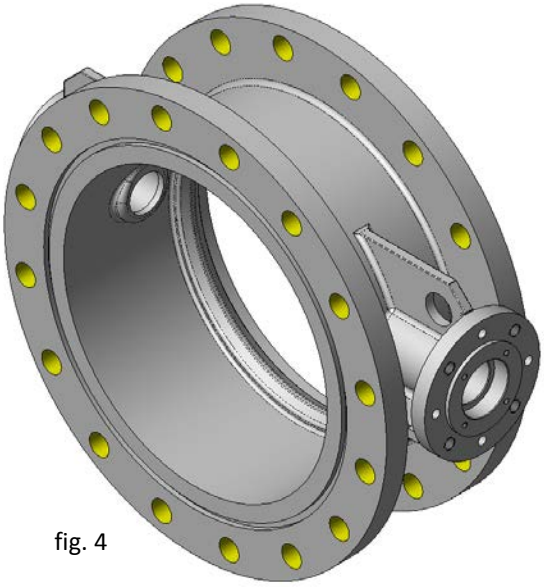


fig. 4

The collar has transverse hubs for shaft housing. These are secured to the outside by way of reinforcements and ribs, joining the shaft, collar and flange housings. This achieves a highly robust single-piece body which can withstand any level of tension.

The standard manufacture materials are CF8M stainless steel and A216WCB carbon steel. When the body is required in carbon steel, stainless steel AISI 304 is fitted in the sealing ring in order to ensure sealing is carried out on stainless steel.

Other materials such as: GJS-500 nodular cast-iron, stainless steel alloys (AISI316Ti, Duplex, 254SMO, Uranus B6, etc) are available on request.

As standard, iron or carbon steel bodies are painted with an anti-corrosive EPOXY protection (colour RAL 5015). Other types of anti-corrosive protections are available.

2- DISC

The disc basically consists of a smooth, circular base of considerable thickness, and includes two lugs which the shafts the disc swivels on are coupled to. The shafts are joined with cotter pins, and both this joint and the disc itself are sized in line with the work pressure.

In those cases in which the valve is designed with sealing by seals, a recess is machined throughout the perimeter of the main disc, were the elastomer seal is housed, and secured using the seal flange.

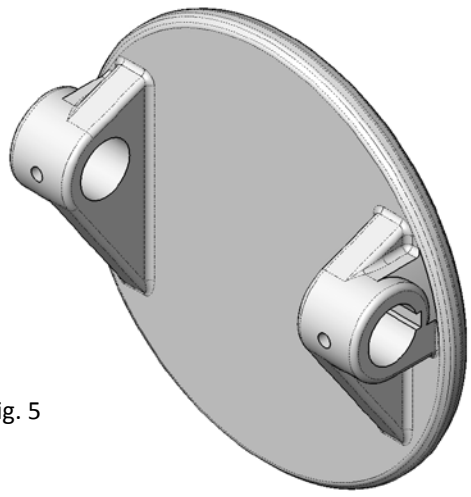


fig. 5

The standard manufacture materials are CF8M stainless steel and A216WCB carbon steel. When the valve is metal/metal sealing and the disc is carbon steel, stainless steel AISI304 is fitted in the sealing area to achieve a 100% stainless steel seal.

Other materials such as GJS-500 nodular cast iron and stainless steel alloys (AISI316Ti, Duplex, 254SMO, Uranus B6, etc) are available on request.
As standard, iron or carbon steel valves are painted with an anti-corrosive protection of 80 microns of EPOXY (colour RAL 5015). Other types of anti-corrosion protections are available.

3- SEAT:

C.M.O.'s RT retention valves are designed with metal/metal seal, in other words watertight integrity is achieved through contact between the body (1) and the disc (2). Both elements are machined with precision to ensure the best possible contact. When the body and the disc are stainless steel, these are machined directly. On the other hand, when any of these elements are not made from this material, stainless steel is fitted on the sealing surface and then machined. The purpose is to achieve a 100% stainless steel seal.

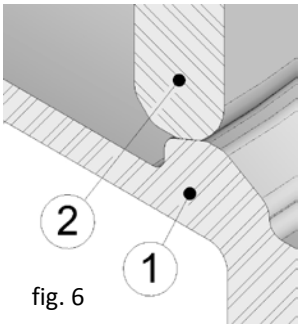


fig. 6

However, there is also the option of sealing with sealing joints. In this case, a recess is machined throughout the perimeter of the disc (2), where an elastomer seal is housed (3). This is secured by way of the seal flange (4) and closes against the body (1). In these cases the seal used is a special elastomer profile, which presses against the stainless steel ring of the body, thus sealing.
A highly efficient sealing system is achieved thanks to the dual eccentric valves. As soon as the valve starts to open, the seal is no longer compressed and does not rub against the body. For this reason the seal is only compressed when closing, avoiding unnecessary crushing and prolonging its working life. In large diameters the elastomer profile can be changed without removing the valve from the pipe.

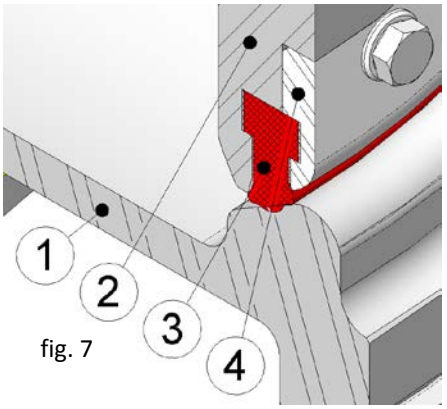


fig. 7

The sealing ring in the body is inside the collar, and is machined to ensure correct sealing whilst minimising the disturbance produced in the flow.

When the valve is ordered with sealing gasket, it is usually EPDM, although other types of elastomer are available to the customer.

Watertight materials

EPDM

This is the standard resilient seal fitted in **C.M.O.** valves. It can be used in many applications, however, it is generally used for water and products diluted in water at temperatures no higher than 90C*. It can also be used with abrasive products and provides the valve with 100% watertight integrity.

NITRILE

Used in fluids containing fats or oils at temperatures no higher than 90°C*. It provides the valve with 100% watertight integrity.

VITON

Suitable for corrosive applications and high temperatures of up to 190°C continuously and peaks of 210°C. It provides the valve with 100% watertight integrity.

SILICONE

Used mainly in the food industry and for pharmaceutical products with temperatures no higher than 200°C. It provides the valve with 100% watertight integrity.

Note: In some applications other types of rubber are used, such as: hypalon, butyl or natural rubber. Please contact **C.M.O.** for any such requirements.

SEAT/SEALS		
Material	**Max. temp. (°C)**	**Applications**
EPDM (E)	90 *	Non-mineral oils, acids and water.
Nitrile (N)	90 *	Hydrocarbons, oils and greases
Viton (V)	200	Hydrocarbons and solvents
Silicone (S)	200	Food Products

NOTE: More details and other materials available to order. * ➔ EPDM and Nitrile: possible up to max temp: 120°C to order.

table 2

4- SHAFTS

C.M.O.'s **RT** retention valve shafts are solid and are manufactured in stainless steel AISI316, AISI420, etc.; these characteristics make it highly resistant and provide excellent properties against corrosion.

Parallel cotter pins (4) are used to transmit the forces between the disc and the shafts, meaning both the disc (2) and the shafts (3) have several cotter holes machined. Self-lubricating bronze bushing (5) is placed in the body hubs (1) in order for the shafts (3) to turn easily.

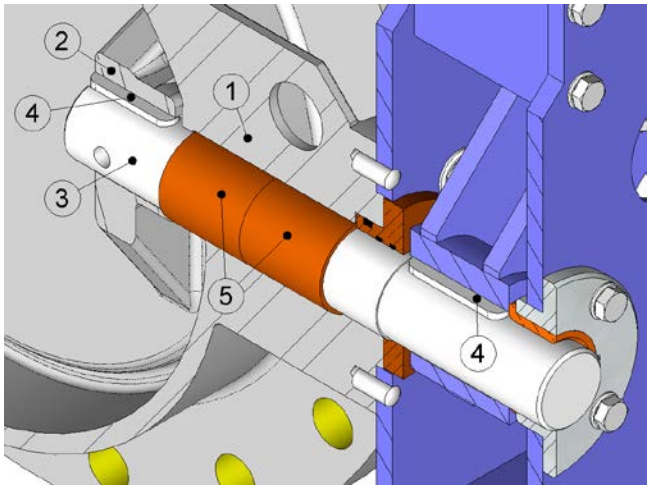


fig. 8

5- O-RING SEALS

O-rings (4) are used to ensure the watertight integrity of the shafts. The only points in which there may be leakages from the valve interior to the exterior are between the shafts (2) and the hubs (1), meaning watertight integrity is achieved by placing O-rings (4) on a bronze flange (3). The O-rings (4) used in the **RT** valves are usually nitrile, although other types of elastomers are available.

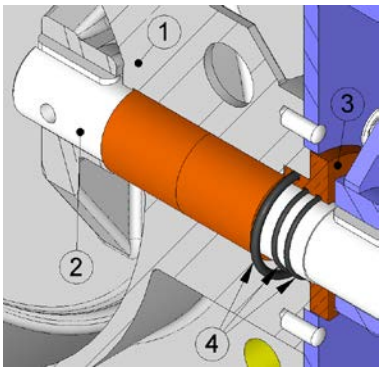


fig. 9

6- ACTUATORS

This type of valve incorporates a drive system comprising a counterweight and hydraulic cylinder, although these are designed solely for the closing operation. As mentioned above, thanks to the bi-eccentric design of the valve, it is the flow itself which opens the valve when passing through it. As soon as the fluid changes direction, if the indication arrow of the body coincides, the same fluid tends to close the valve and the counterweight contributes in carrying out this operation. The hydraulic cylinder is designed to work as a damper and is fitted with damping in the last 10% of the closing run. The purpose is for the valve to make the final close gently, avoiding any hammer effect in the pipe. This hydraulic cylinder is fitted with an oil tank to carry out a closed circuit. This circuit is fitted with a regulation valve, which can be used to adjust the closing time or speed by limiting the passage of hydraulic oil between the tank and the cylinder.

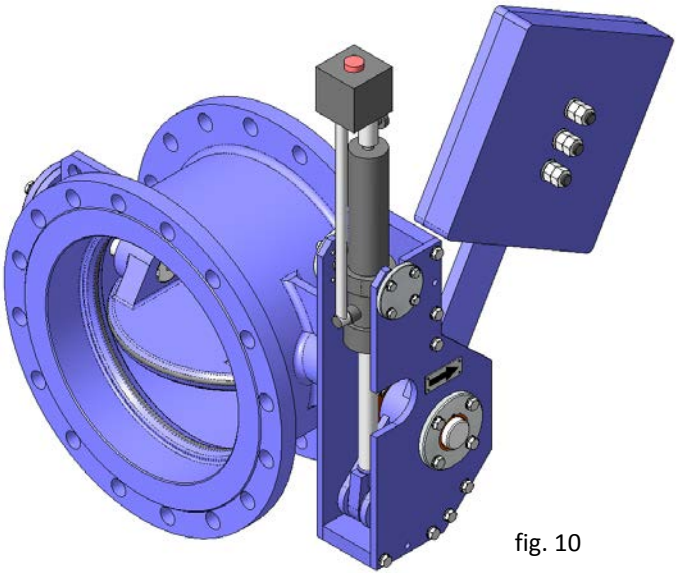


fig. 10

One of the main advantages of this drive is that it does not require any type of electrical supply, and is therefore highly suited for use as a safety valve in emergency situations. For this reason it must be taken into account that, given the design of the valve and the type of drive fitted, the disc cannot be stopped in intermediate positions.

Wide range of accessories available:

Mechanical stoppers
Locking devices
Positioners
Limit switches
Proximity detectors etc.

ACCESSORIES AND OPTIONS

Different accessories are available to adapt the valve to specific working conditions such as:

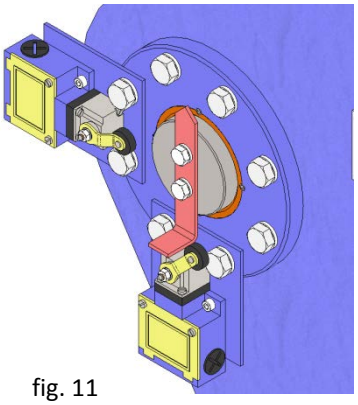


fig. 11

Connection boxes, cabling and hydraulic piping:
Units supplied fully assembled with all the necessary accessories.

Mechanical limit switches or inductive sensors (fig. 11):
An arrow is coupled to the end of one of the shafts in order to indicate the valve opening position; this indication arrow enables the mechanical limit switches, which indicate the position of the valve at each moment.
If the customer so requires, inductive sensors can be supplied instead of mechanical limit switches.

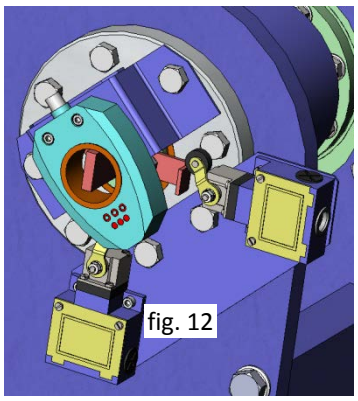


fig. 12

Positioners (fig. 12):
When the position of the valve is to be known remotely, a positioner is installed to indicate the position of the valve continuously.

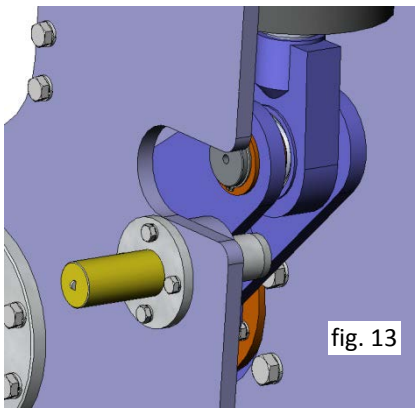


fig. 13

Mechanical locking system (fig. 13):
Allows the valve to be mechanically locked in a set position for long periods.

Stroke limiting mechanical stops:
These allow the degree of opening of the valve to be mechanically adjusted, limiting the required turning travel for the clapper.

Safety guards (fig. 14):
In accordance with European Safety Standards ("EC" marking), the **RT** valves can be fitted with metal guards for the travel of the rod and counterweight, thus preventing any object or body from being accidentally caught or dragged.

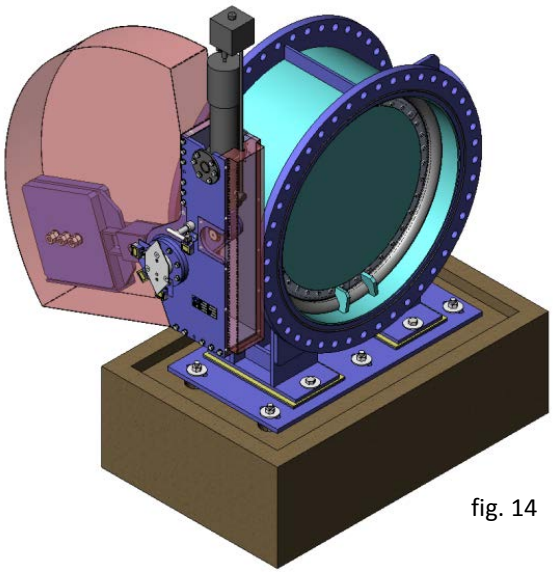
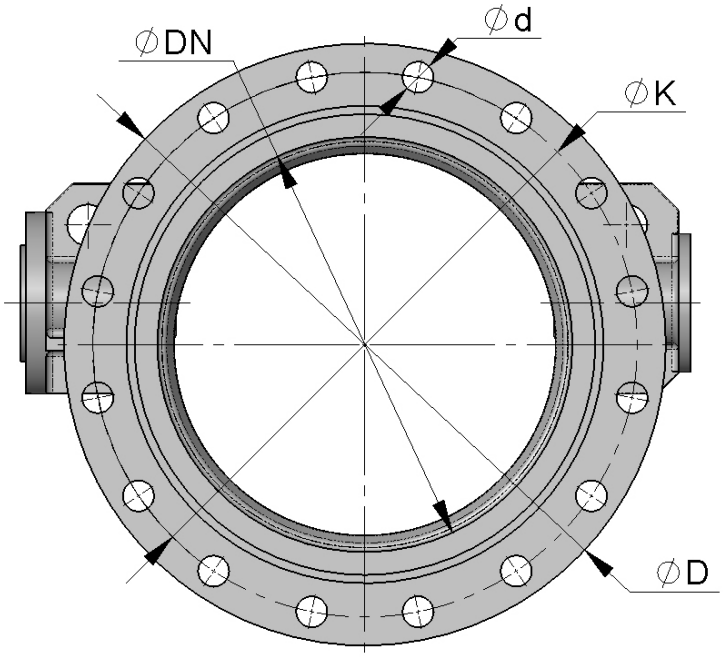


fig. 14

Epoxy coating:
All the carbon steel and iron bodies and components of **C.M.O.** valves are coated with a layer of EPOXY, which makes them resistant to corrosion and gives an excellent surface finish. **C.M.O.**'s standard colour is blue RAL-5015.

INFORMATION AND DIMENSIONS OF FLANGES AND BETWEEN FACES



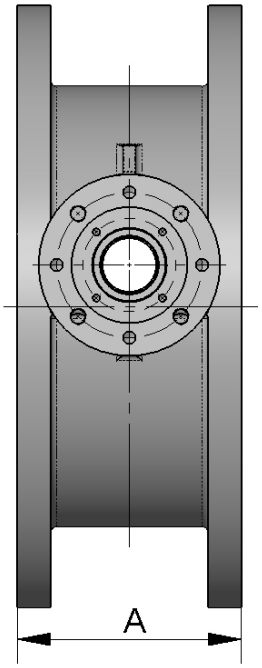


fig. 15

DN	FLANGE DRILLING in accordance with EN 1092-2 PN10					TIGHTENING TORQUE
	A	Qty.	Ød	ØD	ØK	(Nm)
150	140	8	22	315	240	88
200	152	8	22	340	295	88
250	165	12	22	395	350	88
300	178	12	22	445	400	88
350	190	16	22	505	460	88
400	216	16	26	565	515	152
450	222	20	26	615	565	152
500	229	20	26	670	620	152
600	267	20	30	780	725	223
700	292	24	30	895	840	223
800	318	24	33	1015	950	303
900	330	28	33	1115	1050	303
1000	410	28	36	1230	1160	412
1200	470	32	39	1455	1380	529
1400	530	36	42	1675	1590	685
1600	600	40	48	1915	1820	1414
1800	670	44	48	2115	2020	1414
2000	760	48	48	2325	2230	1414

table 3

C.M.O.'s **RT** retention valves have the distance between faces in accordance with Standard EN 558 Table 2 Series 13.

Flange drilling varies depending on customer needs, but one of the most common options is drilling in line with Standard EN 1092-2 PN10.

Table 3 details the most typical levels for drilling flanges and width over flats. The required torque for installation between flanges is also detailed.